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THE EDUCATION OF MEMORY.

IT is not to be disputed that nature shows her accustomed partiality in the bestowal of her mnemonic favors, giving a few people great, another few, feeble memories, while leaving most of us to be content with fairly good native powers in this regard. But her part done, the matter is by no means settled; it remains for all men to train and discipline their mnemonic gifts, just as much as it is their duty to develop their muscles, voices, and intellects—if indeed the memory can be in any right sense separated from the intellect. A really bad memory is a sure proof of a serious defect in one's education; and the fault must be charged up, in large degree, to bad educational methods. A memory natively good or bad needs training; the best will not do its proper work otherwise, while the poorest may be made to do fairly well with proper attention to its development. It is hardly too much to say that, assuming the intellectual energies of two persons to be in other respects equal, the one, however, possessing a trained, the other an untaught, haphazard memory, the advantages, in every domain of thought, are as two to one in favor of the former. If this be anywhere within limits, teachers have a grave responsibility in this matter—a responsibility of which they do not seem to be conscious.

The importance of memory, as an intellectual factor, has always been recognized and insisted upon; but teachers have not yet come to understand how easily susceptible of betterment it is under proper treatment—relying, as they do, too much upon "aids" and "helps"—upon tricks of association and memoranda, instead of adopting direct and simple methods of training, such as they would use in developing any other organic instrumentality.

It may be as well to say at once that it is not the object of this paper to advocate any of the numerous systems of artificial mnemonics, ancient or modern. They are all about on a par with the cunningly devised schemes which start up from time to time to displace the established methods of arithmetic—extremely difficult to learn, and next to useless when acquired. Nor is it here proposed to set forth any newly discovered—any short and easy method. The only object is to emphasize, in the light of modern science, principles long since, and almost uniformly, laid down on the subject by psychologists.

While, then, it is not given to many to have a great memory, it is easily within the reach of most to have a fairly trained and very effective one; and without at least this, one may not hope to do much in any line of thought. Nearly all illustrious men have been greatly indebted to their excellent memories. Sir Francis Bacon had a great memory. He rarely had need to refer to a book once read. Peter Böener says: "He only ordered his chaplain, or me, to look in such an author for a certain place." Ben Jonson, Descartes, Leibnitz, Pascal, the Scaligers, Grotius, Euler, Niebuhr, Mackintosh, Dugald Stewart, Hamilton, and Dean Mansel, all men remarkable in the domain of speculative thought, had uncommonly fine memories. An equally notable list of famous men of action—of famous men of intellect in any domain of life—could be readily made. Great orators and writers are far more indebted to their power to retain, and reproduce freely upon occasion, what they have once learned, than upon their originality and clearness of apprehension. It is certainly not quite the thing to rely upon one's "memory for one's wit," but after all there is a precious little evolved in the world from year to year that is purely original; and the great things accomplished, even by men of wit, are largely due to a fresh and skillful handling of the slowly accumulated and common thought of the world.

There is a great deal of mere memory packing going on in our modern educational methods, especially in elementary work; but the memory is not a mere receptacle to be packed with a mass of facts, as one neatly folds and skillfully bestows goods in a case, or on a shelf. It is a delicate organism, governed by the law of life—the law of growth and decay—with, no doubt, a physiological basis, closely analagous to that which underlies sense-perception. There is every reason to think that both these psychical powers depend, from the mechanical side, upon the molecular constitution of the masses of nerve-tissue in the cerebral hemispheres; and that these neural groupings undergo rapid and important changes, with more or less permanent readjustments, under the influence of volitional activities. Not that the will can reach them by direct and specific action, for we are not in the least conscious of what these movements are, or where they are; but just as we learn to use the muscular system, little by little, and without the slightest consciousness of what motor nerves we employ, so we have the power to develop by reflex action the brain cells by purposive effort.

Every body knows how immensely the powers of sense-perception can be improved by rightly directed effort. The artist in studying nature readily learns to see what the uncultivated eye is wholly blind to. The musician learns to distinguish notes in a maze of harmonies which the common ear cannot discover; the expert in textile fabrics and the taster in wines acquire marvelously increased powers of differentiation; and so throughout the whole range of the senses and sensibilities.

Now, in the face of the mass of facts brought to light by the physiological psychologists, it is a hopeless task, even if there were any thing to be saved by it, to deny that in all this there are physical changes going on in the neural system, which are the exact mechanical correlatives of the psychical activities. This does not in the least detract from the spiritual side of personality, or in any wise threaten to degrade thought and feeling to mere mass and motion. There was no little alarm felt on this point in the first half of the present century, when the researches of the psycho-physicists began to attract the attention of the old-fashioned metaphysicians; but it is quite time for the panic to subside, as indeed it is rapidly doing. The most advanced thinkers, on the physical side of science, see the chasm between sensation and mechanism with perfect clearness, and admit it with the utmost candor. To show this, it may be well to quote one of the many utterances of Dr. Tyndall on the point. He says:[1]

> "The passage from the physics of the brain to the corresponding facts of consciousness is unthinkable. Granted that a definite thought, and a definite molecular action in the brain, occur simultaneously; we do not possess the intellectual organ, nor apparently any rudiment of the organ, which would enable us to pass, by a process of reasoning, from the one to the other. They appear together, but we do not know why. Were our minds and senses so expanded, strengthened, and illuminated as to enable us to see and feel the very molecules of the brain; were we capable of following all their motions, all the groupings, all the electrical discharges, if such there be; and were we intimately acquainted with the corresponding states of thought and feeling, we should be as far as ever from the solution of the problem, 'How are these physical processes connected with the facts of consciousness?'"

The office of memory is twofold. In the first place, it must receive and fix impressions, with their time-signs. This is its function of "retention;" and the way it is done, under the physical hypothesis, is by new and measurably permanent molecular adjustments of brain-tissue, answering to sense—or thought—stimulation, somewhat as a sensitized plate fixes the modifications of light when exposed; or as a phonographic cylinder records sounds at the point of the stylus.

But if memory were confined to this one office of registration it would be of no use. It must have the power of restoring to consciousness, with its time-setting, what has previously been an object of thought. It is called, in this office, "recollection" or "reminiscence." The theory of previously imposed molecular conditions in the cerebral areas seems, in a measure at least, to explain this power of recalling the past. If it be true that the physical signs of all past acts of consciousness remain in the brain, relapsing into a quiescent state, it only needs that these latent signs be reanimated, or somehow quickened to stand out once more in consciousness, and this we may easily think might be accomplished by reflex stimulation, either through a slightly increased blood supply, or from some form of nervous energy. We know, without doubt, through the phonograph, that the physical signs of thought are wrought into inorganic and dead matter, and are actually reproduced by physical means; and why shall we not think that something infinitely more delicate and refined may take place in highly organized, living substance? If this stimulating process in the brain be by volitional effort, we have an act of reminiscence; if the stimulation take place without purposive effort, we have the spontaneous reappearance of previous mental states, sometimes called "suggestion."

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[1] "Scope and Limits of Scientific Materialism."

Now, whether the physical conditions in all this be granted, or not, we have here at least a working hypothesis which thoroughly accords with the facts. We all know that past acts of consciousness are constantly turning up in our minds without any sufficient explanation, and that we are all the time exercising our power of recollecting the past. But the chief point we have in view is to emphasize the true methods of memory development; and this hypothesis serves the excellent purpose of making plain how such discipline and development must proceed. There can be no reasonable doubt that the memory may be trained, strengthened, and expanded just like any physical organ within the sphere of volition; and that the methods to be adopted ought to be substantially the same. As has been already said, the mnemonic organ in different people is originally different in quality and capacity; but so is the arm. No one will contend, however, that though the biceps, flexors, *et cetera*, of two arms differ originally in mass and quality, vast changes may not be wrought by rightly directed exercise. We must, of course, accept what nature has given us in the original composition and volume of brain and limb; but it is with us and our teachers to say what we shall do with the one and the other. What arm and brain shall prove to be when we arrive at that stage which should show the highest and best activities must be set down to the manner in which they have been handled.

The responsibility in this regard lies primarily with the teacher, as the training ought to begin long before a child could possibly work out any rational plan for himself. Plainly, it is the business of the teacher, first of all, to understand the nature of the work he has to do, in order that he may not only begin at the earliest stage of education to train his pupils, but that he may teach them the theory of their own psycho-mechanisms, and so show them that education does not consist nearly so much in *gathering* knowledge, as in *developing* the knowledge-gathering instrumentalities. One of the great faults, perhaps the greatest fault of the current system of elementary teaching, is the hours and hours worse than lost in the work of cramming facts and processes into poor little urchins as if they were barrels to be filled. Not only does it go on through the too many hours of appointed school work, but after the children are released from the prison routine of school, and when they ought to go free to make mud pies, they are pounced down upon by a loving, ambitious mother, or maiden aunt, and cramped and worried through other hours of so-called preparation for the next day's school! It is murderous, and often in witnessing the process one feels like calling out for the police.

The power of retention in the mnemonic organ can be greatly developed by proper efforts, without doubt. Attention is an act of the will; and the thing to be arrived at is the habit of clear and distinct apprehension through attention. Mere cramming is not attention, but, on the contrary, leads directly away from it. By the act of grasping firmly an object of thought, it is not alone that a more decided physical sign of the thought is fixed in the brain adjustments, but no doubt the organ itself is made better in that regard; just as, when an object is grasped with more firmness, it is more securely held and the hand itself is strengthened for such work in the future. This is not only not accomplished by going over and over a thing in a dull, monotonous way, but there is cultivated the habit of denseness and vacuity. One of the best students we ever knew did his studying chiefly off the book. His eyes were not strong, and to save them he used to read over by daylight what he had to master, and at night, with his back to the light, he would go over his work, only referring to the text when it was absolutely necessary. Of course his retentive power was naturally good, but undoubtedly the fact that he expected his memory to do its full work enabled him to read to very different purpose than would have been the case if he had expected to read and re-read with his eyes on the page.

The first thing to be done with a feeble memory is, so to speak, to make friends with and encourage it. It will not do to scorn it, and give it up as a bad lot, resorting to memoranda and artificial make-shifts; but one ought to take it into confidence, bear patiently with it, and if more drastic methods are necessary, become imperative and exacting. Memoranda are well in their way, but their place is not in the disciplinary field. Poetry, dates—any thing may be made the occasion of such discipline. Our own memory—we take leave to say—is a lamentable example of misteaching and neglect; so much so that, as a rule, upon being introduced to a stranger, our long-standing habit of not expecting our memory to do its proper service, masters us, and we shall have forgotten the name before we have had time to walk from one end of the room to the other. This is not the fault of memory, but is our own fault in not using it properly. But while we confess to being the victim of a vicious habit, we feel that we have just grounds to complain that no teacher ever cautioned us about it in our youth.

The reproductive power is also largely a matter of discipline. The well-known law of association, of which so much has been made by the empirical school of thought, must be recognized as a principle in the continuity of the empirical self. Truly stated it is that acts of past consciousness never stand isolated and out of touch with each other; but form a plexus or network woven together more or less closely in groups, so that the presence of any one such previous state has a tendency to call up others of the group to which it belongs. This obviously finds easy explanation, from the physiological side, in the hypothesis we have been considering, and receives from it additional light as to its *modus operandi.* According to the hypothesis, such plexus is an objective, physical fact, and it only needs, as we have seen, that the physical signs of the past be in some way revived to be once more presented to consciousness, very much as characters written in invisible ink become legible under the action of liquids or heat. We know that this power is indirectly under the control of volition; and the restoration will be the more rapid and distinct as the will more and more exercises its office—with constantly growing capacities for better results. As to how the will manages to find a desired area, there is no more puzzle than as to how it finds the proper nerves to stimulate in speech or locomotion. We have absolutely no consciousness of using any nerves in relaxing or contracting any muscle of the body, and yet every step of the way had to be learned through volitional and tentative effort.

The habit of demanding of the memory rapid and accurate work in reproducing what has been committed to it, is thus of the highest importance. Practically this should be made an object of care throughout one's disciplinary period in all knowledge-gathering processes; but exercises expressly devised for this purpose by the teacher, or self-imposed, would prove very effective. For example, in history, the memory might be called upon, as an exercise, to give a list of kings, in one or more countries, who have usurped thrones; of generals who have acted treacherously; of famous men who have had famous sons, etc. So in literature or science, or in the affairs of every-day life. But all this is sufficiently obvious.

Now, it is to be freely admitted that the training of memory is but one phase of mental development. We have all known people who seemed never to forget anything, and who yet failed to reap any kind of substantial benefit from their superior powers in this regard. We have in mind at this moment a man with a remarkably tenacious memory, who was a vast reader, and a great talker with an excellent vocabulary; but he could not teach, he could not write, and he could not conduct any sort of business. Nor did his failure seem to be due to a lack of will-power, for he showed great tenacity of purpose and managed to have pretty much his own way. His tastes were refined and highly cultivated; he was not without ambition; and yet he could do nothing. There was an important screw loose somewhere in his make-up, and we have often wondered where it could be. Undoubtedly he lacked the power of coördination—a thing easy to say, and easy to see in most people, but not so easy to define or explain. It is this power of coördination which seems, in most cases, to make the difference between a wise man and a fool; while perhaps a slight failure in this way makes the genius. If one could, so to speak, look in upon the psycho-mechanisms of people—that is, get at them subjectively as one can at the cerebral hemispheres objectively—it is quite likely that as a rule no great differences would be discoverable. It is not probable that the simpleton could be distinguished from the philosopher until the whole system under the control of the will began to act; just as one could by no means tell how much cord-wood could be cut in a day with an ordinary axe until the hand that was to wield it was discovered. With the average mind the capacity to think, if the thought-mechanisms were rightly handled, would not perhaps be nearly so different as we are accustomed to suppose. To illustrate our meaning, if Becky Sharp had been given the psycho-mechanisms of Amelia, that enterprising young woman would probably have managed to see the soft places in people's characters, and how to accomplish her little schemes, with measurably the same success she did with her own admirable thinking apparatus. But the point of the present contention is that the thought-instrumentalities undergo rapid developments and so change from day to day, especially in the earlier years of existence, so that one's power to think (of which memory is such an important factor) is physically bettered or crippled by one's own actions.

The business of the educator lies, without doubt, in the harmonious development of the whole personality, and not in the mere enlargement or transformation of any one, or several of the mechanisms of the self. It lies as much, perhaps more, in the cultivation of the will as in that of the sensibilities and the understanding. Of course we do not pretend to say, and we do not think, that a Newton or a Shakspere could ever be made out of the ordinary school boy (chiefly, perhaps, because the educator must work from the outside alone by way of stimulation, while the only real work must be wrought from within by self-action), but it is a mere truism to say that vast differences can be wrought in a boy by right handling, as against wrong; and here the real question recurs, What is a right handling, and what a wrong?

The answer would open up the whole subject of education, and therefore must be let go one side, except in so far as it has been touched on already. It is safe to say, however, that a right handling implies all efforts which go to the promotion of a fully developed and harmoniously coördinated self-activity. In the earlier stages, and well along in the educational processes, the object should be, not so much the acquisition of knowledge, as the developing of the knowledge-acquiring powers. Of course all through this disciplinary period much knowledge will be gained; but the mistake is that, as a rule, the object is to learn *things*, while the true end, the development of the intellectual powers, is left to shift for itself. We have a conviction that if the process were turned the other way, and conducted upon true psychological principles, far better results would be attained, with less weariness to the student and in shorter time. We are free to say further that in our opinion there ought to be chairs established in our universities and normal schools, which should be charged, not only with the duty of unfolding to students the principles of proper brain-development, but also with the conduct of practical exercises in intellectual gymnastics. Such work would show, we doubt not, just as marked results as the trainer of the bodily powers can boast of in muscular development. Students, as a rule, do not know how to study, and many—perhaps, most—never learn.